APPENDIX A

Sampling and Analysis Plan Approval Documentation

Draft

Sediment Sampling and Analysis Plan

Port of Vancouver, Vessel Approach and Turning Basin Dredging Project

Prepared for

Port of Vancouver
3103 Lower River Road
Vancouver, Washington 98660

Prepared by

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CITATION

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ACRONYMS

CRD	Columbia River Datum
CSL	Clean up Screening Levels
DMEF	Dredged Material Evaluation Framework
LCR	Lower Columbia River
MDL	method detection limit
MLLW	mean lower low water
NSM	new surface material
PAE	phthalate acid esters
PAH	Polyaromatic hydrocarbon
PSDDA	Puget Sound Dredged Disposal Analysis
QA/QC	Quality assurance and quality control
SAP	Sediment Sampling and Analysis Plan
SL	screening level
SQS	Sediment Quality Standards
SWRO	Southwest Regional Office
TCE	trichloroethylene

1. INTRODUCTION AND BACKGROUND INFORMATION

This Sediment Sampling and Analysis Plan (SAP) has been developed to describe the sediment characterization information to support a permit application for the dredging of sediments and the construction of new berthing facilities at the Port of Vancouver. The dredging project is part of the Columbia Gateway Project and is designed to provide access to deep-draft cargo vessels to the proposed docks at parcel 3 as part of the Port of Vancouver's Columbia Gateway Project. Sediment characterization will be conducted to evaluate sediment conditions and confirm that sediments in the dredging and pier development area are in compliance with Sediment Management Standards (173-200 WAC) and as defined in the Dredged Material Evaluation Framework (DMEF), Lower Columbia River Management Area criteria (USACE 1998).

1.1 PROJECT LOCATION AND DESCRIPTION

The project location is Parcel 3 in the northern undeveloped portion at the Port of Vancouver along the Columbia River, between approximately River Mile 101 and 102, in Section 40, Township 2 North, Range 1 West, Vancouver, Clark County, Washington as illustrated on the Sauvie Island Oregon – Washington Quadrangle, United States Geological Survey 7.5 Minute Series. The site is known as the Columbia Gateway property. The proposed dredge prism is located adjacent to the Washington side of the Federal Navigation Channel opposite the Columbia River confluence of the Willamette River (Figure 1-1). The project address is:

3103 Lower River Road
Vancouver, WA 98660

The Port of Vancouver proposes to dredge approximately 1,560,000 cubic yards of dredge material from the Columbia River in an area adjacent to the north side of the Federal Navigation Channel generally between river mile 101 and 102 to accommodate a vessel approach and turning basin. The Port is proposing to maintain the turning basin at the proposed depth of 48-feet (43 feet plus 5 feet advance maintenance overdredge) below Columbia River Datum (CRD) for a period of 20-years, with approximately 260,000 cubic yards of dredge material being removed for maintenance every 4 years (i.e., 1,300,000 total cubic yards over 20-year period). The proposed project includes the construction of new berthing piers along a line offshore of the 20 ft contour to accommodate large vessels (Figure 1-2).

Material will be removed using either a clamshell bucket dredge or a cutterhead suction dredge operated from a barge. No dredging is proposed above the -20 ft CRD and the dredge cut slope will be 3:1 (or less) to minimize sloughing (Figures 1-3 through 1-5).

Dredged material will likely be disposed of as fill in an upland location at the Port of Vancouver Gateway site. This dredged material will likely be stockpiled near the Columbia River on Port of Vancouver property and will be dewatered with return water flowing to the Columbia River. Intermediate and final disposition will depend on the findings of the analyses conducted under this plan.

Dredging would occur during the November 1 to February 28 approved in-water work period for the Columbia River.

Parametrix Port of Vancouver 553-4523-802/01(01) 8/05 (B)

Figure 1-1
Port of Vancouver
Vessel Approach and Turning Basin

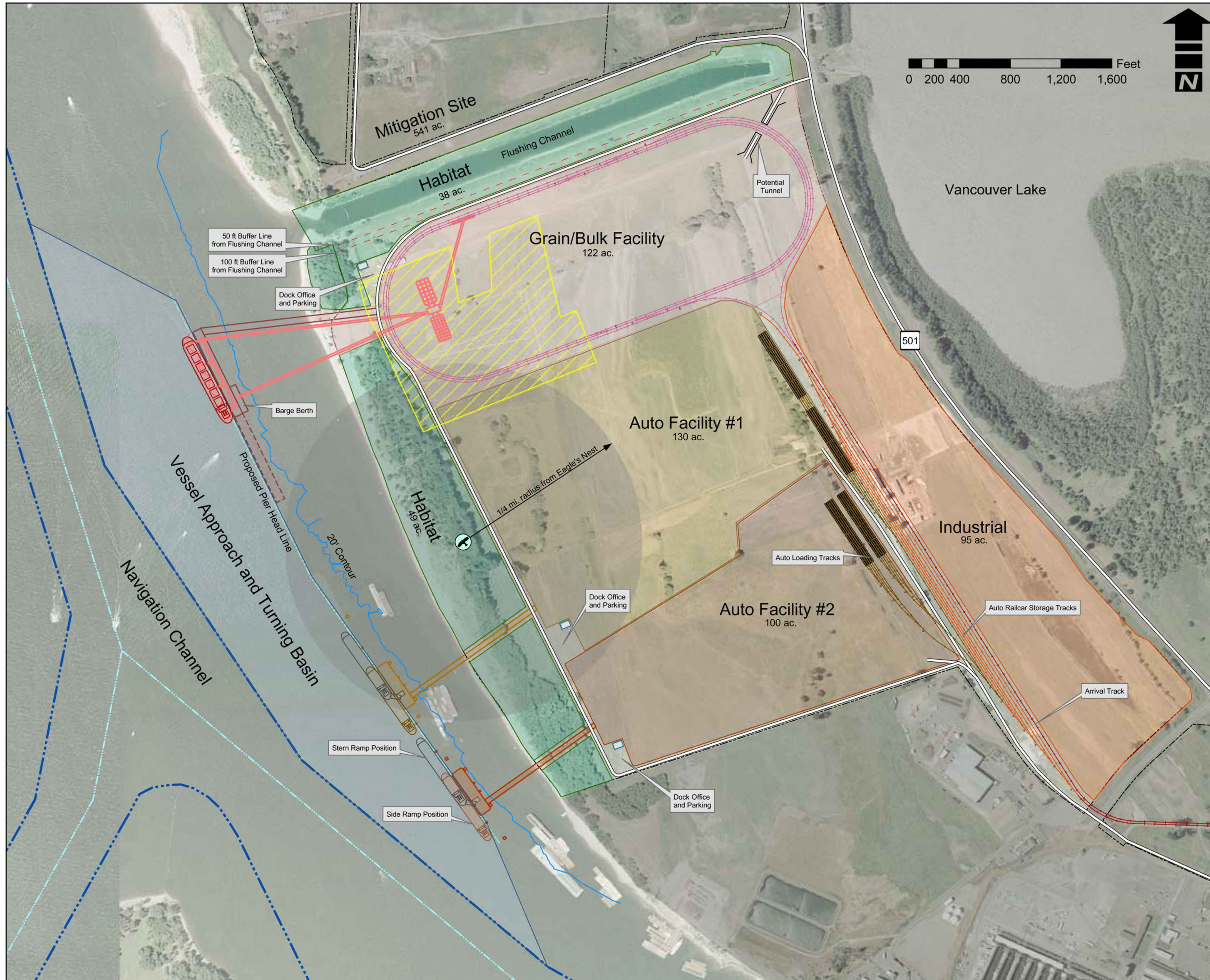
PORT OF VANCOUVER, U.S.A.

Columbia Gateway

Preferred Alternative Parcel 3 Detail Plan

Legend

- Auto Facility #1
- Auto Facility #2
- Grain / Bulk Facility
- Industrial
- Habitat
- Auto Dock #1
- Auto Dock #2
- Grain / Bulk Dock
- Second Grain / Bulk Dock
- Rail - Arrival Track
- Rail - Grain / Bulk Loop
- Rail - Auto Railcar Storage
- Rail - Auto Loading
- Road
- Parcel Boundary
- 50 ft. Flushing Channel Buffers
- 20 ft. Contour
- Pier Head Line
- Navigation Channel
- Navigation Channel CL
- 1/4 mi radius from Eagle's Nest
- Channel Improvement Dredge Disposal Site



All information is subject to survey verification

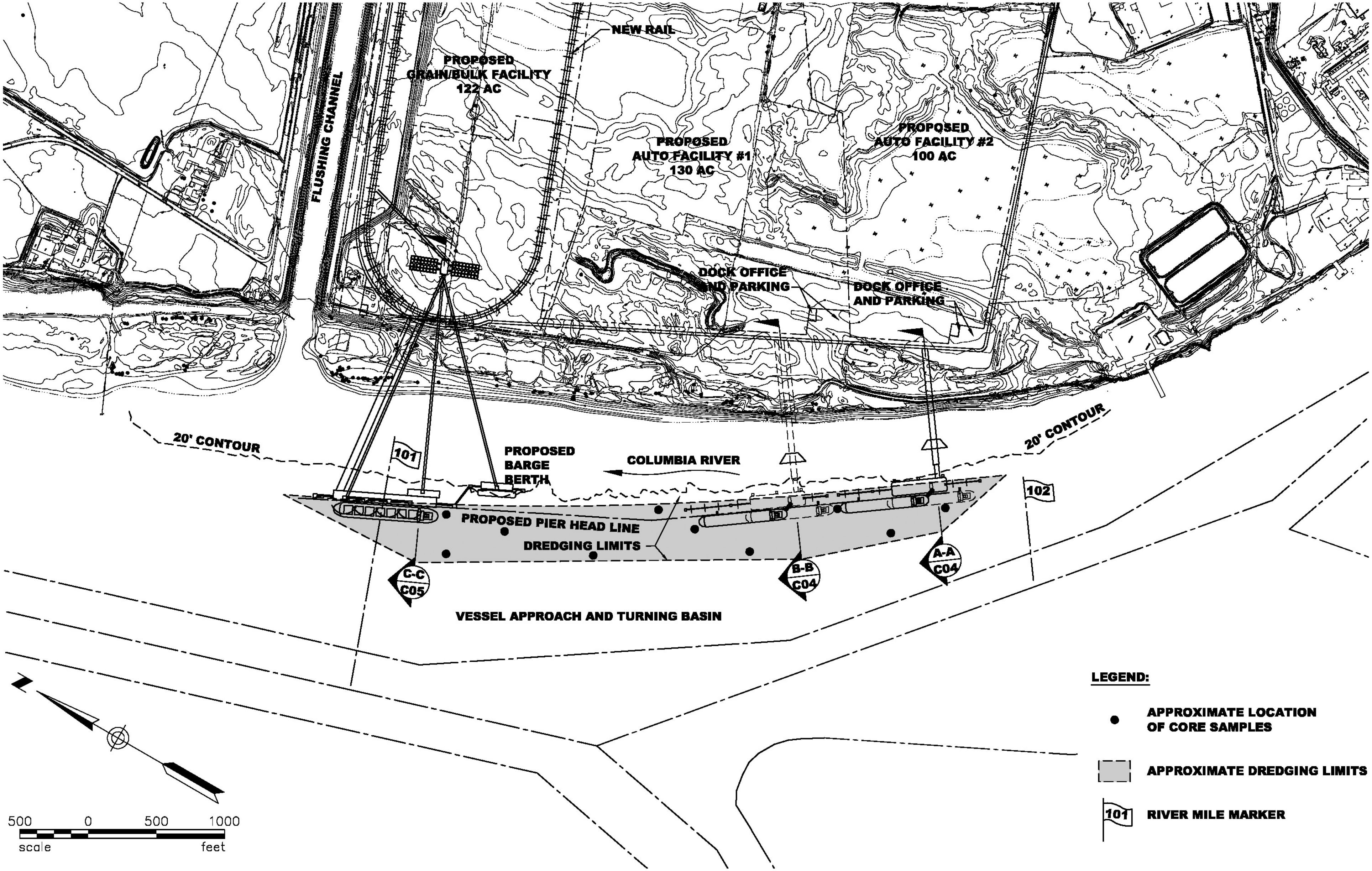
Produced December 10, 2003

Prepared for: Port of Vancouver

Prepared by: PB Ports & Marine

Figure 1-2
Port of Vancouver
Columbia Gateway Detail Plan

PORT OF VANCOUVER - COLUMBIA GATEWAT NEPA SUPPORT



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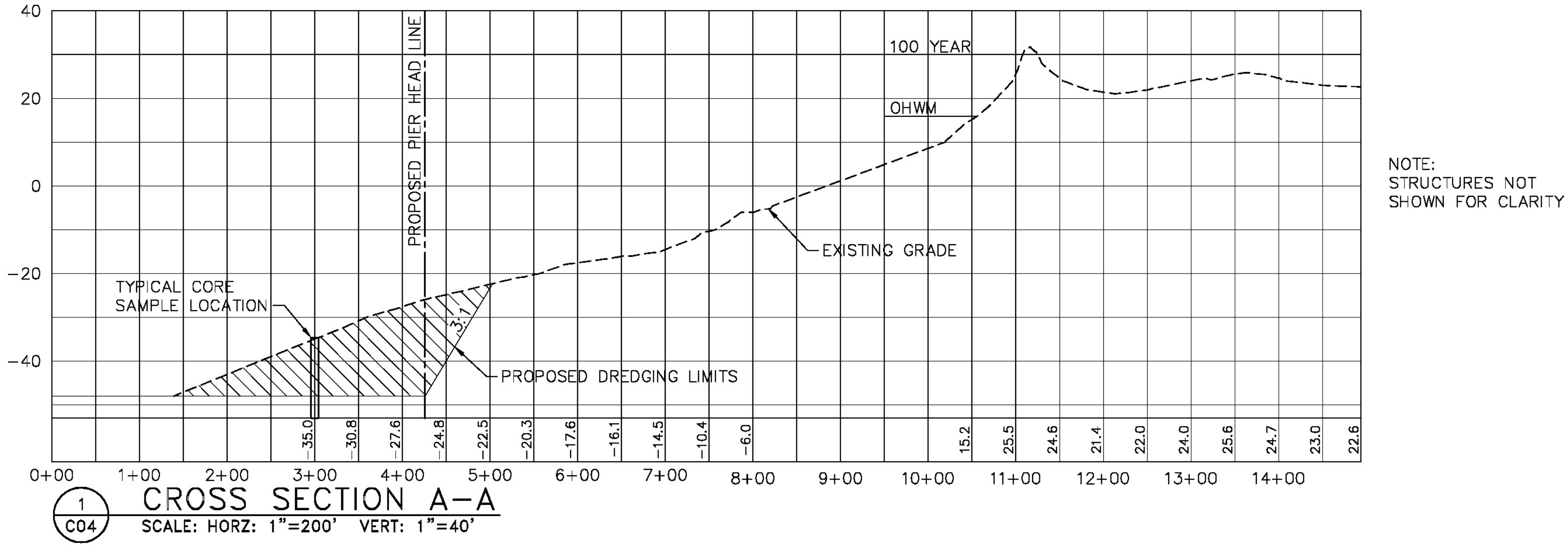
PORT OF VANCOUVER - COLUMBIA GATEWAY NEPA SUPPORT

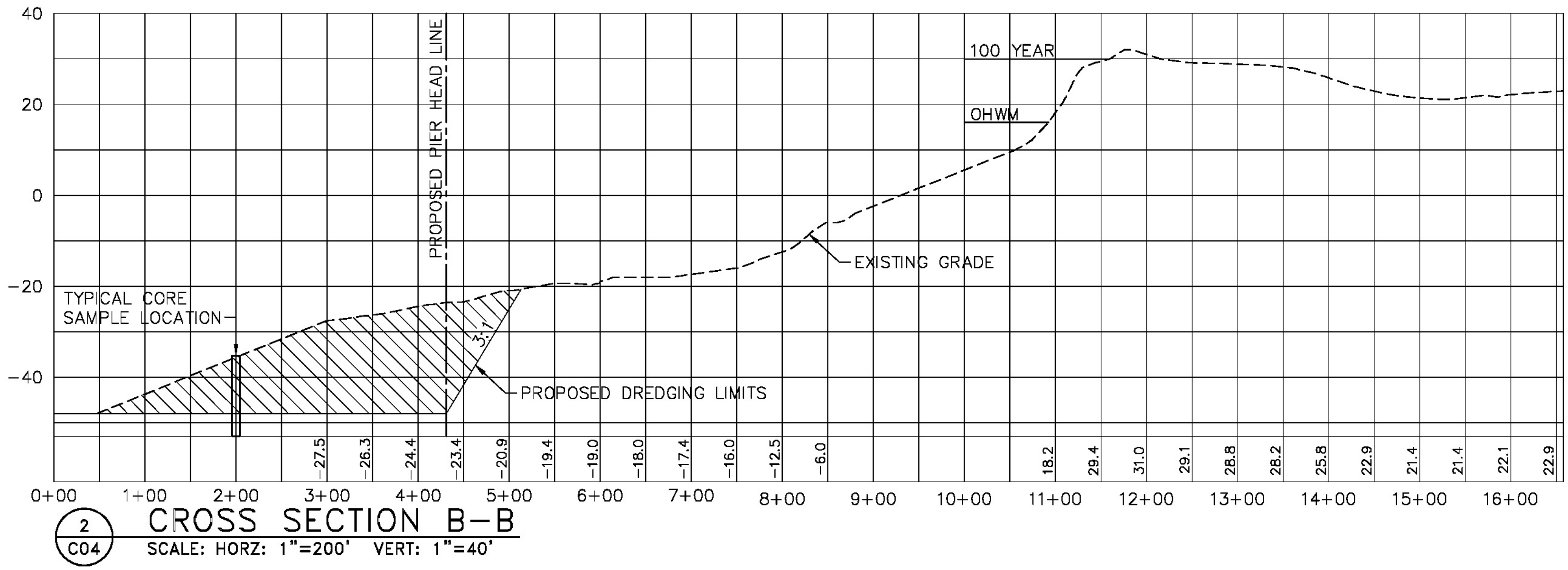
FIGURE 1-3
CONCEPTUAL PARCEL 3 SITE PLAN

DRAWN BY: T. NGUYEN
DESIGNED BY: M. EDBERG
CHECKED BY: M. EDBERG
DATE: 09/02/2005
SHEET: 1 OF 5



CROSS SECTION A-A

SCALE: HORZ: 1"=200' VERT: 1"=40'



CROSS SECTION B-B

SCALE: HORZ: 1"=200' VERT: 1"=40'

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PORT OF VANCOUVER - COLUMBIA GATEWAY NEPA SUPPORT

FIGURE 1-4

AUTO DOCK DREDGING SECTIONS AND TYPICAL CORE SAMPLE LOCATION

DRAWN BY: T. NGUYEN
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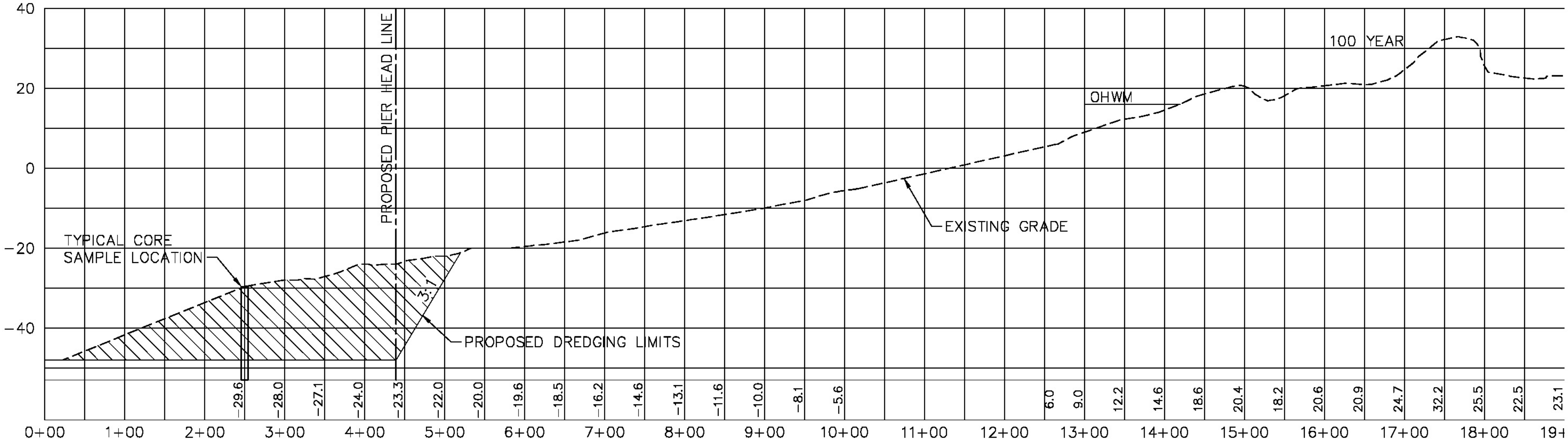
CHECKED BY: M. EDBERG
DATE: 09/02/2005
SHEET: 4 OF 5



1
C05
CROSS SECTION C–C
SCALE: HORZ: 1"=200' VERT: 1"=40'

NOTE:
STRUCTURES NOT
SHOWN FOR CLARITY

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PORT OF VANCOUVER - COLUMBIA GATEWAY NEPA SUPPORT

FIGURE 1-5

AUTO DOCK DREDGING SECTION AND TYPICAL CORE SAMPLE LOCATION

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CHECKED BY: M. EDBERG
DATE: 09/02/2005
SHEET: 5 OF 5

1.2 SITE DESCRIPTION AND HISTORY

The Port of Vancouver is located on the Columbia River between RM 101 and 105 in Vancouver, Washington. The Port of Vancouver includes berths for Break Bulk, Dry Bulk, Liquid Bulk and Auto unloading facilities. The Break Bulk facility, managed by the Port, handles a wide range of commodities, including pulp, lumber, plywood, and steel. The dry bulk dock is capable of exporting a broad range of dry bulk commodities. The liquid bulk dock is owned by the Port, and is operated by ST Services, Inc, and Tesoro Refining and Marketing Company. It has three pipelines from the dock to several storage tank farms, with a total capacity of over three million barrels. The floating auto dock, cargo staging area and leased auto processing facility was completed in 1995. This facility is capable of high volume unloading, sorting and staging and is the sole port of entry in the United States for Subaru of America, Inc.

The Port of Vancouver is zoned “IH” - Heavy Industrial with a river industrial overlay by the City of Vancouver. The proposed Columbia Gateway project site is located between the Columbia River and Vancouver Lake in the northern portion of the Port of Vancouver property approximately between river mile 101 and 102. The expanded area will be used for Grain/Bulk Facility, Auto Facility and Industrial area.

1.3 SEDIMENT DESCRIPTION

Several studies have been conducted dealing with sediment physical characteristics and chemistry evaluations of the lower Columbia River. Based upon historical data collected by the USACE, Portland District, sediment from the main Federal Navigation Channel of the Lower Columbia River (LCR) was found to be predominantly fine to medium-sized sand with less that 1.0 percent silt, clay and finer material. A recent survey of channel sediment, completed in 1997 in connection with the proposal to deepen the navigation channel (USACE 1996) found that out of a total of 89 samples, only six had fines content greater than 5 percent. Of the six, four had fines content greater than 20 percent, however, all but one of these samples was collected outside the areas dredged to maintain the channel. Generally sediments within the mainstem of the Columbia River consist of fine to medium grained sand and generally have been found to be suitable for placement at unconfined aquatic sites or on beach nourishment sites. A brief description of recent studies in the Columbia River near the proposed project site are provided below.

1.3.1 1993 Bi-state Study

The Bi-state Study, conducted in 1993, undertook a systematic assessment of sediment quality of the LCR from the mouth to Bonneville Dam. In this study, 40 of the 54 locations sampled were intentionally positioned to collect fine-grained sediments that are considered more likely to contain contaminants, in water depths of 5 to 20 feet. The Bi-state Study found that many of the metals listed in Table 8-1 of the DMEF were detected but none were found in the finer-grained sediment samples, nor in samples with coarser-grained material, at levels that exceeded the screening level guidelines adopted in the DMEF.

The Bi-state study detected relatively few instances of significant PAH contamination in LCR sediments. The few instances where PAHs were detected, samples were collected from locations downstream of larger urban areas and are possibly associated with stormwater runoff. While persistent in the LCR, the Bi-state Study considered pesticides in sediments to be a minor problem. PCBs were also detected very rarely in the sediment and were determined to not be a problem.

Dioxins and Furans are known to have a very widespread distribution in the LCR watershed. Dioxins and Furans were detected in all 20 samples analyzed in the study for Dioxin/Furan, however, this was expected as very low detection limits are achievable for these compounds, less than one part per trillion. The highest concentrations of these compound occurred downstream of locations affected by an active or historical discharge from a bleach kraft pulp mill.

1.3.2 1988 Screening Survey

At the request of the Ecology Southwest Regional Office (SWRO), the Toxics Investigations/Ground Water Monitoring Section conducted a reconnaissance survey of sediment quality at five ports along the lower Columbia River during September, 1987 (WDOE 1988). Two stations included in the study were sampled at the Port of Vancouver to characterize the occurrence of toxic chemicals in the sediments and assess the potential for sediment toxicity. The two stations within the Port of Vancouver (below VANALCO aluminum smelter at river mile 102.5 and the Vancouver Lower Turning Basin at river mile 105) were chosen for sampling based on potential sources of contamination from a paper mill, aluminum smelter, chemical storage facilities, STP, and urban runoff (Figures 1 and 2 of Screening Survey Report in Appendix A). Samples were collected using 0.1 m2 van Veen grab. The top two cm layer from two or three grabs from each station was pooled for the analysis.

Sediments at the port of Vancouver generally consist of sandy material. Metals concentrations were found to be generally low. Antimony, selenium, silver, and thallium were not detectable. Concentrations of other metals were not appreciably elevated above those measured at Reed Island – considered a reference station for purposes of the 1988 study – except for the following:

- The highest lead (140 mg/kg) and second highest copper (54 mg/kg) concentration, 9 and 14 times reference levels, respectively, occurred at the Vancouver lower turning basin sampling location.

Prior to 1988, in response to an Ecology compliance order, the Port of Vancouver conducted an investigation of impacts from copper concentrate ore spills at the loading facility bordering the lower turning basin (Century West engineering Corp., 1988). That study reported high concentrations of copper (to 54,200 mg/kg) and, to a lesser extent, lead (to 796 mg/kg), arsenic (to 365 mg/kg), zinc (to 5,395 mg/kg), and mercury (to 0.25 mg/kg) in the immediate vicinity of the loading facility. Downstream of this site only copper concentrations appeared elevated compare to the background levels reported in the document.

Volatiles – No volatile organic compounds were detected at detection limits ranging from 1.4 to 15 ug/kg.

Acid/Base/Neutrals – Polyaromatic hydrocarbon (PAH) and phthalate acid esters (PAE) were detected at all sites during the 1988 study. Dibenzofuran was also detected at the Port of Vancouver sites and a trace of isophorone, a solvent and intermediate in chemical synthesis, was detected at Vancouver below the VANALCO aluminum smelter. In most cases concentrations of the above compounds were below detection limits and reported by the laboratory as estimates.

Chlorinated Pesticides – Pesticides were not detected in the Port of Vancouver sediments.

Polychlorinated Biphenyls – PCBs (quantified as Aroclor-1254) were detected in sediments collected in Vancouver below VANALCO (58 µg/kg).

Resin Acids – Three sites, including Vancouver, with potential pulp mill influence and Reed Island were analyzed for resin acids. Chlorinated resin acids are unique to bleach mills using chlorine. Resin acids were detected at each of the sampling sites in the study below pulp mills A chlorinated resin acid, dichlorodehydroabietic acid, was detected in the Vancouver lower turning basin (60 µg/kg, estimated). Total resin acid concentration was 570 µg/kg at the Vancouver lower turning basin.

None of the sediments assayed in the 1988 study appeared to have substantial toxicity toward *Hyalella* or *Daphnia*. Little or no mortality occurred among *Hyalella*. Results of the limited survey of sediment quality at lower Columbia River ports suggest the levels of chemical contamination to be generally low. That may reflect the general non-depositional character of most the sites in the investigation, rather than the absence of contaminant sources. A copy of the complete Screening Survey report is provided in Appendix A.

1.3.3 2001 VANALCO Aluminum (former ALCOA Aluminum Plant)

A total of twenty-five (25) samples were collected from the north side of the Federal Navigation Channel and the adjacent nearer shore area at Columbia River mile 103 in June 2001 (Figures 1 and 2 in VANALCO Aluminum Sediment Quality Evaluation in Appendix B). The goal of the sampling event was to confirm PCB contamination and further characterize the Federal channel and adjacent sediment for possible contaminants. One vibra-core sample was collected at one location where the highest PCB concentration was recorded in a report prepared for Alcoa, dated March 2000. In that study, conducted by Wind Ward Environmental, LLC of Seattle, Washington, 26 of 35 analyses were found to have PCBs above the method detection limit (MDL) and 15 analyses exceeded the 130 µg/kg screening level (SL) in the DMEF, ranging from 150 µg/kg to 28,000 µg/kg.

One vibra-core sample was analyzed in two 4-foot lifts. The two lifts were submitted for physical analyses including total volatile solids and were analyzed for metals, TOC, pesticides and PCBs, phenols, phthalates, miscellaneous extractables, PAHs, organotins (bulk), and dioxin/furan. An additional 24 surface grab samples were analyzed only for Pesticides and PCBs. The station location of the vibra-core sample V-VC-01 was selected to duplicate the location of the highest analytical result (28,000 µg/kg) reported for PCBs in a sample from the Wind Ward Environmental report.

Based on the two vibra-core samples analyzed for physical characteristics, the samples were classified as poorly graded sand. Mean grain size for the samples is 0.41 mm with 99.22 percent sand. None of the contaminants tested for were found to be at or above their respective SLs in the two (2) vibra-core samples. In the six (6) grab samples taken nearest to the shore, Araclor 1248 was found at levels that exceeded the SL of 130µg/kg for total PCBs. For all the remaining samples, the values for total DDT and PCBs were found to be significantly below the SLs for these contaminants.

1.3.4 1997 Columbia River Channel Deepening Feasibility Study

In June of 1997, eighty-nine stations were sampled from the Columbia River Channel from RM 6 to RM 106 for physical analysis. Twenty three samples were further analyzed for chemical analysis for metals, PAHs, Pesticides, PCBs, Pore Water TBT, and dioxin/furan screen. Several stations were selected upstream of the Port of Vancouver proposed dredging site in RM 103 to RM-106. As stated previously, of a total of 89 samples, only six had fines content greater than 5 percent. Of the six, four had fines content greater than 20 percent, however, all but one of these samples was collected outside the areas dredged to maintain the channel. Generally sediments within the mainstem of the Columbia River consist of fine to medium grained sand and generally have been found to be suitable for placement at ocean flow-lane disposal sites.

A copy of Appendix B of the Columbia and Willamette River Sediment Quality Evaluation for the Columbia River Channel Deepening Feasibility Report is provided attached to this document in Appendix C.

Metals: Of the 23 samples submitted 3 samples showed the highest levels of metals (# 07, 57, and 76). None of the levels approached the SL in any sample.

Pesticides and PCBs: Pesticides were found in 4 of 23 samples tested, (# 07, 57, 74, and 76). PCBs were found in one sample only, #76. None of the pesticides or PCB levels that were found in samples exceeded the SL for total PCBs.

PAHs: Low levels of PAHs were found in most of the 23 samples submitted for chemical analysis. All levels detected as well as totals, of low and high density PAHs were well below the SLs.

Dioxin/Furan Screen: Only one sample from the Columbia River, #76, was considered a candidate to contain dioxins/furans.

Station #76, located at River Mile 100 directly across the Federal Navigation Channel from the proposed Port of Vancouver Vessel Approach and Turning Basin project, was sampled again in December of 2001 to confirm high concentrations of contaminants (USACE 2001). The reanalysis found that the sediments contained 89.71 percent sand. The sample was additionally tested for metals, PAHs, Pesticides and PCB. Low levels of metals were found in the samples but did not approach screening levels. No PCBs pesticides, phenol, or miscellaneous extractables were found at the MDL in the samples. Two phthalate compounds were detected in two samples but all values were well below the SL. The LPAHs were not detected at the MDL in any of the samples. Low levels of HPAHs were found in one sample but all values ranged below 0.5 percent of their respective SLs.

The material represented by the original sample collected at CR-BC-76 contained 68.2 percent fines. This material is thought to be disposal material from the Willamette River, as it is near the Morgan's Bar disposal site for the 1996 Willamette River dredging event. Material collected in the second sampling event indicated only 0.06 percent fines.

1.3.5 SEDQUAL

A search of the State of Washington Sediment Quality Database revealed several studies conducted in the Columbia River in the vicinity of the proposed Port of Vancouver dredge site other than those listed above. The locations of the studies in relation to the proposed dredge location are presented in Figure 1-4. Table 1-1 below lists the Survey ID of each project from the SEDQUAL database in the Port of Vancouver vicinity with a beginning date and a brief description of the project.

Table 1-1. SEDQUAL Sediment Chemistry Survey ID

Survey ID	Date	Survey Name	Agency
ALCOA001	11/18/1999	Alcoa Former Vancouver Works	Alcoa
ALCOA90	1/29/1990	ALCOA Aluminum - Class 2 Inspection	WA DOE - EILS program
ALCOAP2a	8/15/2000	ALCOA-Phase 2a	Alcoa Aluminum
ALCOAP2b	11/12/2001	ALCOA-Phase 2b	Alcoa Aluminum
COLR0697	6/2/1997	Col.R. Channel Deepening July 1997	USACE-Portland District
VALCOA93	9/20/1993	Aluminum Company of America, Vancouver	ENSR for WA Ecology

Chemistry data from the SEDQUAL database is presented in two tables in Appendix D. Table D1 is a listing of detected analytes for each station within a project. Table D2 is a listing of those chemical detections that were recorded as an exceedance to the Sediment Management Standards Sediment Quality Standards (SQS) or the Clean up Screening Levels (CSL).

Several studies were conducted nearshore of the Former ALCOA Aluminum Plant. Sampling includes sediments collected at the ALCOA outfall in 1990 (ALCOA90) at river mile 102.5 and sediments collected in 1999, 2000, and 2001 to assess sediments offshore of the ALCOA site (ALCOA001, ALCOAP2a, and ALCOAP2b) respectively. In each of these three studies, elevated levels of PCBs consistently exceed SQS and/or CSL. One station, S-15 in the ALCOAP2b survey, also exceeded SQS for Benzo(g,h,i)perylene and Indeno(1,2,3-c,d)pyrene.

One station associated with the 1997 USACE survey for the Columbia River Channel Deepening Survey, Station CR-BC-84 was sampled at approximately river mile 105. Sediments at this station exhibited high levels of Benzo(g,h,i)perylene, Fluoranthene, HPAHs, LPAHs, Phenanthrene, and Pyrene.

In 1993, at approximately river mile 102, samples were collected just downstream of the former ALCOA Aluminum Plant outfall (VALCOA93). Each of four sample locations exhibited exceedances for Zinc.

1.3.6 Flushing Channel

The Flushing channel, constructed in 1982, connects the Columbia River to Vancouver Lake to enable water flow from the lake to the river. The flushing Channel is located on Port property and adjacent to the north side of the proposed Vessel Approach and Turning Basin dredging project (see Figure 2). Maintenance dredging has not occurred since construction. As part of another maintenance project, the Port is proposing to dredge the flushing channel to its design depth of -8 ft CRD. Subsurface sediment sampling was conducted for the Port of Vancouver in the Flushing Channel between the Columbia River and Vancouver Lake to determine whether the proposed dredge material is suitable for stockpiling and use as clean fill on upland property at the Port. Excerpts of the Results of the Sediment Sampling at Flushing Channel to Vancouver Lake Vancouver, Washington report, dated November 20, 2003, are provided in Appendix E.

Sampling was conducted in the Flushing Channel in September and October, 2003 in accordance with the DMEF. A total of 10 subsurface sediment samples were collected at locations shown on Figures 2a and 2b in the Flushing Channel sediment report in Appendix E. Samples were collected using a vibro core devise fitted with 4" core barrels and samples were analyzed for TOC, Metals, Tributyltin (TBT) in pore water, Grain size, Chlorinated pesticides, PCBs, and semivolatile organic compounds (including phenols, PAHs, phthalates, chlorobenzenes, and miscellaneous compounds).

Grain size and chemistry results are reported in the tables presented in Appendix A. Sediments at the mouth of the Flushing Channel are predominantly slightly silty, fine to medium sand and become slightly clayey, very sandy silt at the head of the channel.

Although low levels of metals, pesticides, PAHs, (particularly HPAHs) and PCBs were detected in the samples, all ten subsurface sediments samples were well below the DMEF screening criteria. The results from this dredging material characterization study confirmed that the proposed dredge material is suitable for stockpiling and for use as clean fill on upland property at the Port.

1.3.7 Berth 15 Terminal Barge 4 Facility

Sediment samples were collected for analysis for the Proposed Berth 15 Barge Facility, Terminal 4, Port of Vancouver, in May 2004. Samples were collected consistent with the SAP developed in accordance witih the DMEF.

The Port proposes to develop Berth 15 of the Terminal 4 facility adjacent to the Columbia River (see Figures 2 and 3 in project excerpts of the Sampling and Analysis Plan and data tables provided in Appendix F). Development of Berth 15 includes proposed dredging and excavation of a nearshore area for construction of a barge slip. Nine soil borings in three transects were sampled (see Figure 3 in Appendix F). Physical and chemical analyses included conventional parameters grain size, total volatile solids, and total organic carbon, as well as metals, PAHs, phthalates, phenols, miscellaneous extractable compounds, chlorinated hydrocarbons, pesticides, PCBs, and tributyltin.

Sediment chemistry results are presented in tables 1 through 7 in the Sediment Analytical Results section provided in Appendix F.

While all samples analyzed exhibited low levels of metals none approached screening levels in the DMEF. Only one sample, represented by the composite of C1 through C3 showed low levels of PAH compounds, though none exceeded DMEF. Composite C4/C6 had detectable levels reported for 4,4'-DDT and Aroclor 1254, but not at levels above screening levels of the DMEF.

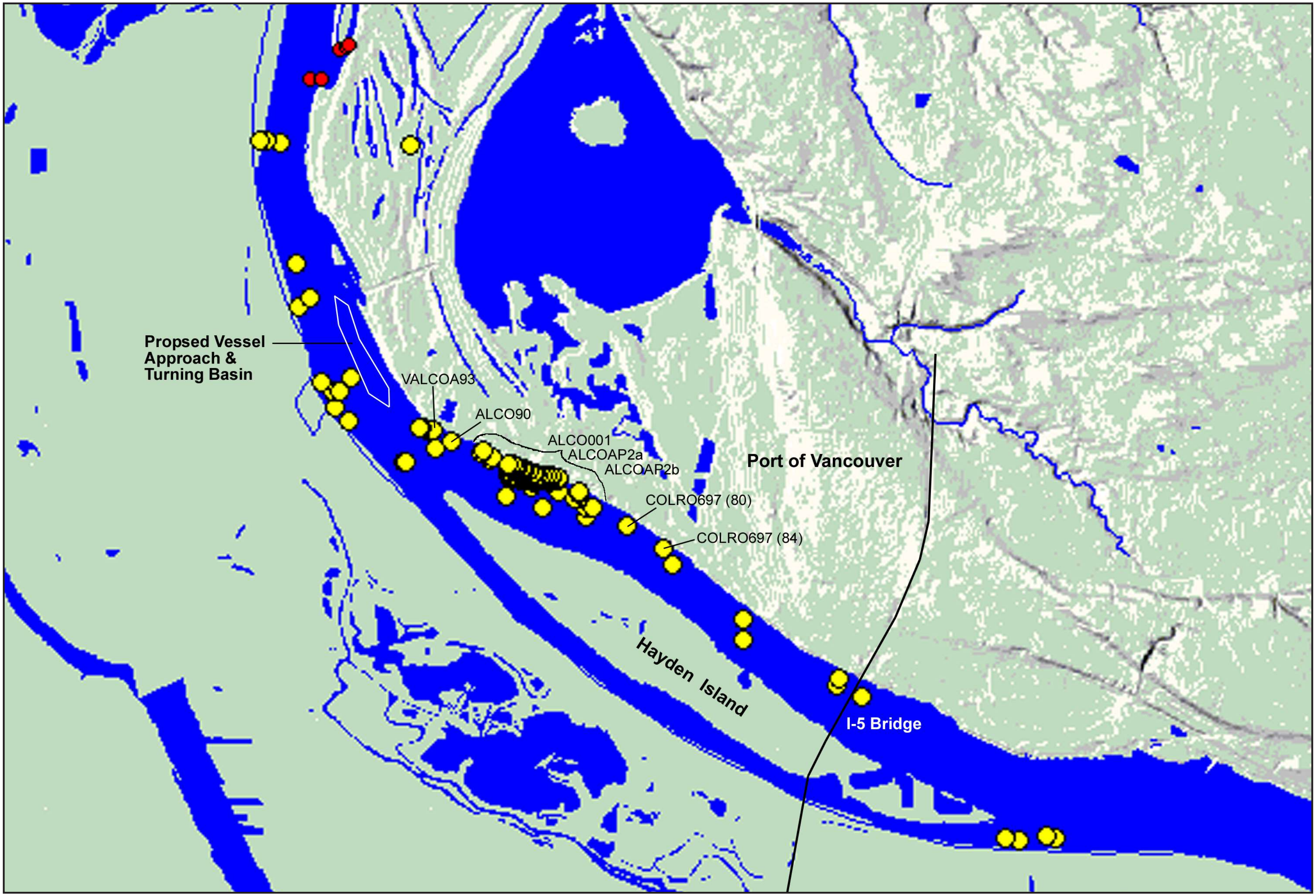

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Figure 1-6
Port of Vancouver
SEDQUAL Sample Locations

2. SAMPLING APPROACH

2.1 SEDIMENT INVESTIGATION OBJECTIVES AND DESIGN

The objectives for the sediment monitoring work described in this SAP are to:

- Collect sediment within the proposed dredge areas and investigate whether the sediments to be dredged meet the 2003 Sediment Management Standards and Dredged Material Evaluation Framework, Lower Columbia River Management Area screening levels.
- Collect chemistry and physical information to support upland disposal or reuse decisions.
- Collect chemistry information for sediments below the proposed dredge prism where possible to determine the presence of chemical contaminants in the new surface material (NSM).

The sediment investigation will follow the Sediment Sampling and Analysis Plan Appendix: Guidance on the Development of Sediment Sampling and Analysis Plans Meeting the Requirements of the Sediment Management Standards (Chapter 173-204 WAC) (SAPA) (PTI and McFarland 1995).

Samples will be collected for chemical analyses, and will be analyzed for the chemicals and conventional sediment variables listed in Table 1 of the SAPA guidance and Table 8-1 of the DMEF. Because dredged material will be disposed of in an upland facility, no biological analyses will be conducted.

2.2 NUMBER AND TYPE OF SEDIMENT SAMPLES

The DMEF guidance document describes the process by which the number of samples within a dredge management area is determined. Factors include river mile location in the Columbia River, type of facility, proximity to known chemical contaminant sources and recent data from the site.

The Port of Vancouver proposed dredge area, between river mile 101 and 102 is within the river miles 0 to 106 which are generally considered exclusionary in the main stem of the Columbia River. The exclusionary ranking is based on available data that indicate that sediments within the Federal Navigation Channel of the Columbia River generally consist of coarse-grained sediment with at least 80 percent sand and a Total Volatile Solids content of less that 5.0 percent. Sediments that are composed of greater than 80 percent sand, gravel or other naturally occurring bottom material and that have a total volatile solids content of less that 5.0 percent, or sediments that meet this requirement and are targeted for beach nourishment or restoration are excluded from further testing for aquatic disposal in the Lower Columbia River Management Area, provided that the sediments are not located within the likely impact zone of an active and significant contaminant source.

Sediments within the Federal Navigation Channel at river mile 101 and 102 generally consist of material containing greater than 80 percent sand, however, available data from recent studies conducted in the area indicates the potential for sediments in the proposed dredge area to contain low concentrations of chemicals of concern, particularly PCBs. Table 5-2 of the DMEF indicates that sites where available data indicate the potential for low concentrations of CoCs to exist in the sediments will be given a low ranking.

Table 6-1 in the DMEF indicates that the number of samples to collect is one sample per 100,000 cubic yards of dredge material for homogeneous sediments in low-ranked sites. The proposed volume of sediments to be dredged is 1,560,000 cubic yards. The Port of Vancouver initially proposes to collect 10 core samples for characterization of sediment associated with deepening. Cores will be collected from locations listed in Table 2-1 below and as indicated in Figure 2.

Cores will be driven through the proposed dredge material to a depth of –48 CRD and up to two additional feet or until refusal into the new surface material (NSM) where possible. Material from each core will be vertically homogenized for one sample per core and analyzed; material from the NSM, if collected, will be sampled separately. Any samples collected from the material in the NSM will be held and analyzed only if the material from the core section above has chemical concentrations that exceed DMEF.

Table 2-1. Proposed Core Sample Locations
(NAD 83, US Survey Feet, Washington South)

Sample Number	Latitude	Longitude
Sample 1		
Sample 2		
Sample 3		
Sample 4		
Sample 5		
Sample 6		
Sample 7		
Sample 8		
Sample 9		
Sample 10		

2.3 CHEMICAL ANALYTES

Sediment samples will be analyzed for 61 SMS and DMEF chemicals and for conventional sediment quality variables that are useful in interpreting sediment chemical data (Table 2-2). Table 2-2 lists the chemical analytes and the Sediment Management and Dredged Material Evaluation Framework screening levels.

Table 2-2. Chemical Analytes for Port of Vancouver, Dredged Material

	Sediment Management Standards	Dredged Material Evaluation Framework	
	SQS	SL	ML
Metals (mg/kg dry weight, ppm)			
Antimony	--	150	200
Arsenic	57	57	700
Cadmium	5.1	5.1	14
Chromium	260	--	--
Copper	390	390	1,300
Lead	450	450	1,200

Table 2-2. Chemical Analytes for Port of Vancouver, Dredged Material (continued)

	Sediment Management Standards	Dredged Material Evaluation Framework	
	SQS	SL	ML
Metals (mg/kg dry weight, ppm) (continued)			
Mercury	0.41	0.41	2.3
Nickel	--	140	370
Silver	6.1	6.1	8.4
Zinc	410	410	3,800
Tributyltin (µg TBT/liter-interstitial water)	--	0.15	0.15
Organics (µg/kg dry weight, ppb)	mg/kg OC[a]	ug/kg dry weight	ug/kg dry weight
Naphthalene	99	2,100	2,400
Acenaphthylene	66	560	1,300
Acenaphthene	16	500	2,000
Fluorene	23	540	3,600
Phenanthrene	100	1,500	21,000
Anthracene	220	960	13,000
2-Methylnaphthalene	38	670	1,900
Total LPAH[b]	370	5,200	29,000
Fluoranthene	160	1,700	30,000
Pyrene	1,000	2,600	16,000
Benz(a)anthracene	110	1,300	5,100
Chrysene	110	1,400	21,000
Benzofluoranthenes (b+k)[d]	230	3,200	9,900
Benzo(a)pyrene	99	1,600	3,600
Indeno(1,2,3-c,d)pyrene	34	600	16,000
Dibenzo(a,h)anthracene	12	230	1,900
Benzo(g,h,I)perylene	31	670	3,200
Total HPAH[c]	960	12,000	69,000
Chlorinated Hydrocarbons			
1,3-Dichlorobenzene	--	170	--
1,4-Dichlorobenzene	3.1	110	120
1,2-Dichlorobenzene	2.3	35	110
1,2,4-Trichlorobenzene	0.81	31	64
Hexachlorobenzene (HCB)	0.38	22	230
Phthalates			
Dimethyl phthalate	53	1,400	--
Diethyl Phthalate	61	1,200	--
Di-n-butyl phthalate	220	5,100	--
Butyl benzyl phthalate	4.9	970	--
Bis(2-ethylhexyl)phthalate	47	8,300	--
Di-n-octyl phthalate	58	6,200	
Dibenzofuran	15	540	1,700
Hexachlorobutadiene	3.9	29	270
Hexachloroethane	--	1,400	14,000

Table 2-2. Chemical Analytes for Port of Vancouver, Dredged Material (continued)

	Sediment Management Standards	Dredged Material Evaluation Framework	
	SQS	**SL**	**ML**
Phthalates (continued)			
N-Nitrosodiphenylamine	11	28	130
Total PCBs	12	130	3,100
Pesticides			
Total DDT	--	6.9	69
Aldrin	--	10	- -
Alpha-Chlordane	--	10	- -
Dieldrin	--	10	- -
Heptachlor	--	10	- -
Volatile Organic Compounds			
Ethylbenzene	--	10	50
Tetrachloroethene	--	57	210
Total Xylene	--	40	160
Trichloroethene	--	160	1,600
Phenols (µg/kg dry weight, ppb)			
Phenol	420	420	1,200
2-Methylphenol	63	63	77
4-Methylphenol	670	670	3,600
2,4-Dimethylphenol	29	29	210
Pentachlorophenol	360	400	690
Benzyl alcohol	57	57	870
Benzoic acid	650	650	760
Conventional Parameters			
Total Organic Carbon (%)	- -	- -	- -
Total Solids (%)	- -	- -	- -
Total Sulfides (mg/kg)	- -	- -	- -
Ammonia (mg/kg)	- -	- -	- -
Grain Size	- -	- -	- -
Total Volatile Solids (%)	- -	- -	- -

Note: -- no numerical criterion of this type for this chemical
HPAH high molecular weight polycyclic aromatic hydrocarbon
LPAH low molecular weight polycyclic aromatic hydrocarbon
ML maximum level
PCB polychlorinated biphenyl
SL screening level
SMS Sediment Management Standards (WAC 173-204)

a The listed values represent concentrations in parts per million “normalized” on a total organic carbon basis.

b The total LPAH criterion under the SMS represents the sum of the concentration of the following LPAH compounds: naphthalene, acenaphthylene, acenaphthene, fluorene, phenanthrene, and anthracene. 2-Methylnaphthalene is not included in the LPAH definition under the SMS, but is included in the LPAH definition under the DMEF.

c The total HPAH criterion under the SMS represents the sum of the concentration of the following HPAH compounds: fluoranthene, pyrene, benz(a)anthracene, chrysene, total benzofluoranthenes, benzo(a)pyrene, indeno(1,2,3-c,d)pyrene, dibenzo(a,h)anthracene, and benzo(g,h,i)perylene.

d The total benzofluoranthenes criterion represents the sum of the concentrations of the b, j, and k isomers of benzofluoranthene.

3. FIELD SAMPLING METHODS

3.1 STATION POSITIONING METHODS

The objective of the sampling location positioning procedures is to accurately (+/- 3 ft) determine and record the positions of sampling locations. Proposed sampling locations are presented in Figure 2 and Table 1. Actual sample locations will be recorded at the time of sampling.

Station positioning will be accomplished from the sampling vessel using a differential global positioning system. A Trimble navigation model Pro XR data logger, or similar instrument, will be used to document the coordinates of each sample location. The vessel will be positioned over each sample location prior to deployment of the vibracoring device. The actual sample position will be recorded as the core is extracted from the river bottom. For all sampling positions, latitude and longitude will be recorded in the North American Datum (NAD83) to the nearest 0.1 second.

3.2 SAMPLING EQUIPMENT

Sediment cores for chemical analysis will be collected using a vibrocorer. Cores will be collected using decontaminated 4-inch aluminum core barrels.

Bowls, spoons, and other sampling utensils that come in contact with the sediment samples will be stainless steel. All sampling utensils will be decontaminated prior to sampling and sealed in aluminum foil.

3.3 SUBSURFACE SEDIMENT CORING PROCEDURE

Subsurface sediment sampling will be accomplished using a vibrocore fitted with decontaminated 4-inch aluminum core barrels. The general procedure for collecting core samples is:

1. Make field notes and logbook entries as necessary before and after the sampling process to ensure thorough and accurate record keeping.
2. Position the vessel over the proposed sample location following the station location procedures in Section 3.1.
3. A 14-foot long core tube will be secured to the head assembly and deployed from the vessel.
4. The cable umbilical to the A-frame and core assembly will be drawn in taut and perpendicular, as the core tube rests on the mudline.
5. Location of the umbilical hoist will be measured and recorded; the depth to the mudline will be measure with a survey tape attached to the head assembly.
6. The core tube will be vibrated or driven into the sediment.
7. A continuous core sample will be collected to 13 feet or until refusal.
8. The depth of core penetration will be measured and recorded.
9. The core barrel will be extracted from the sediment using the hydraulic winch.

10. While suspended, the assembly and core barrel will be sprayed off with site water, and then place on the vessel deck.
11. The core barrel will be removed from the sampler and inspected. The recovered core material remaining in the core barrel following retrieval will be measured to aid in the determination of any compaction upon core processing. Every effort will be made to retain as much material in the core as possible. The overlying water and core nose will be removed from the core and the core will be cut into 4 ft sections if necessary, for transport to the processing facility. Each section will be capped at both ends, labeled, and transported to the core processing facility in an upright position in an insulated cool box with ice.

3.4 DECONTAMINATION PROCEDURES

Decontamination is necessary for equipment which contacts any sample to be used for chemical testing. The decontamination procedure will include a phosphate-free detergent wash and successive rinses between all sampling locations. No solvent or acid washes will be used in the field because of safety, rinsate disposal, and sample integrity considerations. All sediment sampling equipment will be decontaminated in the contracted laboratory prior to the sampling event. Additional sets of decontaminated sampling utensils will be on board the sampling vessel to minimize the need for field decontamination by the sampling crew.

This decontamination procedure, based on Puget Sound Estuary Program protocols (PSEP, 1997c) is designed to prevent cross-contamination between sample locations, contamination from the field crew, or contamination from the equipment. Equipment for reuse will be decontaminated between sample locations aboard the vessel according to the procedure below before each use.

- Site water will be sprayed over equipment to dislodge and remove any remaining sediments from previous sample location;
- Surfaces of equipment contacting sample material will be scrubbed with brushes using an Alconox solution;
- Scrubbed equipment will be rinsed and scrubbed with clean tap water; and
- Equipment will undergo a final spray rinse of deionized water to remove tap water impurities.

Additional precautions will be taken to minimize the possibility of cross-contamination. Sediments contacting the sides of the core will be avoided when removing sediment sample material. A new decontaminated core barrel will be used for each sample position.

3.5 SAMPLE COMPOSITING STRATEGY AND METHODS

Each core, once removed from the sampler, will be cut into 4-ft sections. Each section will be capped, labeled and stored in a cool box with ice for transport to the core processing facility. Each core section will be placed horizontally onto the core processing table. The cores will then be split longitudinally using a circular saw using care not to contaminate the sediment with excessive core tube debris. When the core is opened, the sediment within the core will be described on the core extrusion log form. Using field log documentation of penetration and recovery, the sample sections representing the material within the proposed dredge prism and any material from the NSM will be determined and described separately.

Material from each core for analysis of sulfides and volatile organics will be removed directly from representative portions of the core prior to placing material into the composite bowl. Sufficient sediment for all remaining analysis will be collected from the entire length of the core, representing the proposed dredge prism, and placed into the composite bowl using a decontaminated spoon. Care will be taken to avoid placing material that came into contact with the sides of the core into the composite.

3.6 SAMPLE CONTAINERS AND LABELS

All sample containers and labels will be supplied by the analytical laboratories. Self-adhesive labels will be attached to the outside of all sediment sample containers. Before filling each container, the following information will be recorded on the label in waterproof ink: sample identification number, project name, station number, sampling date and time, initials of sampling personnel, and preservative (if any). Labels will be covered with clear plastic tape to protect them from loss or damage.

3.7 FIELD DOCUMENTATION

Field documentation will include a field log, sample log forms, and chain-of-custody forms. A field log will be used to record general information including names of field crew members, sampling dates, arrival and departure times, weather, and other observations.

A sample log will be maintained throughout the sampling event; the log will include station ID, core number, time, fathometer depth (ft), and depth to the mudline as measured using a weighted fiberglass tape measure. Observations of the sediment surface and any deeper layers will also be recorded, including layer depths, color, sediment type, odor, type and amount of any debris observed in the sample, and any evidence of contamination. Individual core locations will have a position logged in the DGPS memory and positions will be recorded on the data log form.

4. SAMPLE HANDLING PROCEDURES

Sample handling procedures are designed to ensure sample integrity between the time of collection and the time that laboratory analysis begins. These procedures include sample storage, chain-of-custody, and sample delivery.

4.1 SAMPLE STORAGE REQUIREMENTS

All sediment samples will be placed in a cooler and held at approximately 4°C until they are received by the analytical laboratories. Upon sample receipt, the laboratories will comply with storage temperatures and maximum holding times required for the specific analyses to be performed (Table 4-1). Samples for mercury analysis will be frozen. Chemistry analyses will proceed as soon as possible after sample collection.

Table 4-1. Sample Storage Temperatures and Maximum Holding Times for Sediment Sample Analyses

Sample Analysis	Storage Temperature	Maximum Holding Time
Grain size	Cool, 4°C	6 months
Total solids	Cool, 4°C	14 days
Total volatile solids	Cool, 4°C	14 days
Total organic carbon	Cool, 4°C	14 days
Ammonia	Cool, 4°C	7 days
Total sulfides	Cool, 4°C (1 N zinc acetate)	7 days
Metals (except mercury)	Cool, 4°C	6 months
Mercury	Frozen, -18°C	28 days
Volatile organics	Cool, 4°C	14 days
Semi-volatiles, Pesticides, and PCBs	Cool, 4°C	14 days until extraction 40 days after extraction

4.2 CHAIN-OF-CUSTODY PROCEDURES

Chain-of-custody procedures will document the transfer of all samples from the Field Operations Coordinator to the analytical laboratories. Triplicate chain-of-custody forms will be used to record each sample container at the end of each sampling day. At a minimum, the forms will identify the sample collection date and times, the project name and number, and the number of preserved and unpreserved sample containers. It is the Field Operations Coordinator's responsibility to ensure that each form is accurately completed and signed at the time of sample transfer. One copy of each form will be placed in a waterproof bag and taped to the inside of each sample cooler. The Field Operations Coordinator will retain one copy of each form. Sample coolers will be sealed with chain-of-custody tape and kept in a secure location when not in the presence of the Field Operations Coordinator or an assigned sampling crew member.

4.3 SAMPLE DELIVERY

All samples will be hand delivered to the laboratories within 24 hours following completion of the sampling event. Individual sample containers will be placed in individual plastic bags, and packed to prevent breakage in transport coolers. Sufficient ice will be sealed in plastic bags and packed in the coolers to maintain samples at 4°C. One copy of the chain-of-custody form will be sealed in a waterproof bag and taped to the inside of the cooler lid. A chain-of-custody seal will be placed on the outside of the cooler any time it is not with the Field Operations Coordinator or assigned crew. Upon receipt of the samples at the laboratories, the condition of the samples will be inspected and recorded, and the chain-of-custody form will be signed by the receiving laboratory staff.

5. LABORATORY ANALYTICAL METHODS

5.1 CHEMICAL ANALYSES AND TARGET DETECTION LIMITS

Chemical analyses of sediment samples will include 61 chemicals for which numerical criteria exist under SMS and DMEF and conventional sediment variables that are useful in interpreting other sediment chemical analysis data.

Table 5-1 summarizes the recommended sample preparation methods, analytical methods, and reporting limits for DMEF chemicals and conventional sediment variables. Achieving the reporting limits in Table 4-1 will generally allow comparison with most numerical criteria. Samples may be analyzed using additional clean-up steps or alternative test methods to achieve lower detection limits. For example: hexachlorobenzene, trichlorobenzene, and hexachlorobutadiene may be analyzed by GC/EPD (EPA Method 8081) as an alternative to 8270. Detection limits should be at a level sufficient to meet the SQS screening levels. If after using appropriate sample clean-up procedures the analytical laboratory is unable to achieve sufficiently low detection limits to allow comparisons with SQS criteria, then the laboratory will contact Parametrix to report the difficulty before completing analyses.

5.2 PHYSICAL ANALYSIS

Physical testing, grain size analysis, will be included in the analysis for each sample collected from the cores. Material from each core will be vertically homogenized for each core. Material representing the NSM will be sampled and analyzed separately if required.

5.3 CORRECTIVE ACTIONS

The analytical laboratory may be required to implement corrective actions and reanalyze samples if data quality assurance reviews indicate that specific control limits were not met in sample analyses. Quality control procedures, control limits, and corrective actions for organic and metal analyses are summarized in Tables 11 and 12 of Ecology’s sediment sampling and analysis guidance (PTI and McFarland 1995).

Table 5-1. Recommended Sample Preparation Methods, Analytical Methods, and Reporting Limits for Sediments

Chemical	Recommended Sample Preparation Methods	Recommended Analytical Methods	Sediment Method Reporting Limits (1)
Metals (mg/kg dry wt)			
Antimony	PSEP (5)	ICP-MS (7)	0.05
Arsenic	PSEP (5)	ICP-MS (7)	0.5
Cadmium	PSEP (5)	ICP-MS (7)	0.05
Chomium	PSEP (5)	ICP-MS (7)	
Copper	PSEP (5)	ICP-MS (7)	0.1
Lead	PSEP (5)	ICP-MS (7)	0.05
Mercury	MER (8)	7471A (8)	0.02
Nickel	PSEP (5)	ICP-MS (7)	0.2
Silver	PSEP (5)	ICP-MS (7)	0.02
Zinc	PSEP (5)	ICP-MS (7)	0.5
Organometallic Compounds (µg/L)			
Tributyltin (interstitial water)	NMFS	Unger	0.02
Organics (µg/kg dry wt)			
LPAH			
Naphthalene	3550 (9)	8270 (10)	10
Acenaphthylene	3550 (9)	8270 (10)	10
Acenaphthene	3550 (9)	8270 (10)	10
Fluorene	3550 (9)	8270 (10)	10
Phenanthrene	3550 (9)	8270 (10)	10
Anthracene	3550 (9)	8270 (10)	10
2-Methylnaphthalene	3550 (9)	8270 (10)	10
HPAH			
Fluoranthene	3550 (9)	8270 (10)	10
Pyrene	3550 (9)	8270 (10)	10
Benz(a)anthracene	3550 (9)	8270 (10)	10
Chrysene	3550 (9)	8270 (10)	10
Total benzofluoranthenes	3550 (9)	8270 (10)	10
Benz(a)pyrene	3550 (9)	8270 (10)	10
Indeno(1,2,3-cd)pyrene	3550 (9)	8270 (10)	10
Dibenz(a,h) anthracene	3550 (9)	8270 (10)	10
Benz(ghi)perylene	3550 (9)	8270 (10)	10

Table 5. Recommended Sample Preparation Methods, Analytical Methods, and Reporting Limits for Sediments (continued)

Chemical	Recommended Sample Preparation Methods	Recommended Analytical Methods	Sediment Method Reporting Limits (1)
Chlorinated Hydrocarbons			
1,3-Dichlorobenzene	P&T (12)	8270 (10)	10
1,4-Dichlorobenzene	P&T (12)	8270 (10)	10
1,2-Dichlorobenzene	P&T (12)	8270 (10)	10
1,2,4-Trichlorobenzene	3550 (9)	8270 (10)	10
Hexachlorobenzene (HCB)	3550 (9)	8270 (10)	10
Phthlalate			
Dimethyl phthalate	3550 (9)	8270 (10)	10
Diethyl phthalate	3550 (9)	8270 (10)	10
Di-n butyl phthalate	3550 (9)	8270 (10)	10
Butyl benzyl phthalate	3550 (9)	8270 (10)	10
Bis(2-ethylhexyl)phthalate	3550 (9)	8270 (10)	200
Di-n-octyl phthalate	3550 (9)	8270 (10)	10
Phenols			
Phenol	3550 (9)	8270 (10)	30
2-Methylphenol	3550 (9)	8270 (10)	10
4-Methylphenol	3550 (9)	8270 (10)	10
2,4-Dimethylphenol	3550 (9)	8270 (10)	50
Pentachlorophenol	3550 (9)	8270 (10)	50
Miscellanious Extractables			
Benzyl alcohol	3550 (9)	8270 (10)	10
Benzoic acid	3550 (9)	8270 (10)	200
Dibenzofuran	3550 (9)	8270 (10)	10
Hexachloroethane	3550 (9)	8270 (10)	10
Hexachlorobutadiene	3550 (9)	8270 (10)	10
N-Nitrosodiphenylamine	3550 (9)	8270 (10)	10
Pesticides			
Total DDT	--	--	--
4,4’-DDE	3540 (13)	8081 (13)	1.0
4,4’-DDD	3540 (13)	8081 (13)	1.0
4,4’-DDT	3540 (13)	8081 (13)	1.0
Aldrin	3540 (13)	8081 (13)	1.0
Chlordane	3540 (13)	8081 (13)	01.0
Dieldrin	3540 (13)	8081 (13)	01.0
Heptachlor	3540 (13)	8081 (13)	01.0
Lindane	3540 (13)	8081 (13)	01.0
Total PCBs	3540 (13)	8082 (13)	20

Table 5. Recommended Sample Preparation Methods, Analytical Methods, and Reporting Limits for Sediments (continued)

Chemical	Recommended Sample Preparation Methods	Recommended Analytical Methods	Sediment Method Reporting Limits (1)
Volatile organic Compounds			
Ethylbenzene	(14)	--	3.2
Tetrachloroethene	(14)	--	3.2
Total xylene	(14)	--	3.2
Trichloroethene	(14)	--	3.2
Conventional Sediment Variables			
Total Volatile Solids (%)	--	(2)	0.1
Total Solids (%)	--	(2)	0.1
Total Sulfides (mg/kg)	--	(2)	1
Ammonia (mg/kg)	--	Plumb 1981 (4)	1
Grain Size	--	Modified ASTM with Hydrometer	--
Total organic carbon (TOC) (mg/kg)	--	(2,3)	0.1

Note:

1. Laboratory MRLs (Method Reporting Limits) on a Dry Weight Basis
2. Recommended Protocols for Measuring Conventional Sediment Variables in Puget Sound, Puget Sound Estuary Program, 1997.
3. Recommended Methods for Measuring TOC in Sediments, Kathryn Bragdon-Cook, Clarification Paper, Puget Sound Dredged Disposal Analysis Annual Review, May 1993.
4. Procedures for Handling and Chemical Analysis of Sediment and Water Samples, Russell H. Plumb, Jr., EPA/Corp of Engineers, May 1981.
5. Recommended Protocols for Measuring Metals in Puget Sound Water, Sediment and Tissue Samples, Puget Sound Estuary Program, 1997.
6. Graphite Furnace Atomic Absorption (GFQQ0 Spectrometry – SW-846, Test Methods for Evaluating Solid Waste Physical/Chemical Methods, EPA, 1986.
7. Inductively Coupled Plasma (ICP) Mass Spectrometry – SW-846, Test Methods for Evaluating Solid Waste Physical/Chemical Methods, EPA, 1986.
8. Mercury Digestion and Cold Vapor Atomic Absorption (CVAA) Spectrometry – Method 7471, SW- 846, Test Methods for Evaluating Solid Waste Physical/Chemical Methods, EPA, 1986.
9. Sonication Extraction of Sample Solids – Method 3550 (Modified), SW-846, Test Methods for Evaluating Solid Waste Physical/Chemical Methods, EPA, 1986. Method is modified to add matrix spikes before the dehydration step rather than after the dehydration step.
10. GCMS Capillary Column – Method 8270, SW-846, Test Methods for Evaluating Solid Waste Physical/Chemical Methods, EPA, 1986.
11. GCMS Analysis – Method 8260, Test Methods for Evaluating Solid Waste Physical/Chemical Methods, EPA, 1986.
12. Purge and Trap Extraction and GCMS Analysis – Method 8260, Test Methods for Evaluating Solid Waste Physical/Chemical Methods, EPA, 1986.
13. Soxhlet Extraction and Method 8080 and 8082, Test Methods for Evaluating Solid Waste Physical/Chemical Methods, EPA, 1987.
14. Sample preparation methods for volatile organic compound analysis are described in the analytical methods.

6. QUALITY ASSURANCE AND QUALITY CONTROL REQUIREMENTS

Quality assurance and quality control (QA/QC) procedures are discussed in detail in the analytical protocols for each chemical. The recommended frequency of specific quality control procedures and associated control limits is summarized in Tables 11 through 14 of Ecology's sediment sampling and analysis guidance (PTI and McFarland 1995).

6.1 QA/QC FOR CHEMICAL ANALYSES

Quality control procedures for chemical analyses include analytical instrument calibration, sample holding times, blank analyses to identify potential sample contamination in the laboratory, duplicate analyses to test analytical precision, and analyses of spikes and standards to test analytical accuracy.

6.2 DATA QUALITY ASSURANCE REVIEW PROCEDURES

In addition to the internal quality control reviews provided by the analytical laboratory, the Project QA Manager will conduct an internal quality assurance review. The internal review of analytical data will follow the lower level (e.g., QA1) review procedures developed for the Puget Sound Dredged Disposal Analysis (PTI 1989). The review will be documented using checklists showing the quality control procedures that were verified.

7. DATA ANALYSIS, RECORDKEEPING, AND REPORTING

Laboratory results will be evaluated using general descriptions of the sediment chemistry data. Any stations exceeding applicable sediment quality criteria for individual chemicals will be clearly identified.

7.1 ANALYSIS OF SEDIMENT CHEMISTRY DATA

Sediment chemistry results will be tabulated for all measured analyses, including conventional sediment variables, whether or not applicable numerical criteria exists in the SMS or DMEF for evaluating the data. The data tables will identify the sampling locations, laboratory sample identification numbers, and dates of sample collection. Appropriate data qualifiers will be attached to chemical concentrations, and detection limits will be reported for undetected analyses. Numerical SMS and DMEF criteria will be included in the tables, and values that exceed the criteria will be highlighted. For criteria that apply to the sum of individual compounds, isomers, or groups of congeners, the sums and their applicable criteria will be reported as recommended in Ecology's sediment sampling and analysis guidance (PTI and McFarland 1995).

7.2 REPORTING PROCEDURES

The results of sediment sampling and analysis will be provided in a written report that includes a statement of purpose, a description of any deviations from this SAP, a general vicinity map and a sampling station map, coordinates for all sampling locations, description of the compositing scheme, type of equipment used, and sediment data tables summarizing the chemical and conventional variables in the same units as Sediment Management Standards SQS. Appendices will include complete Level II laboratory data packages, data quality review documents, copies of field logs and sample logs, and copies of chain-of-custody forms. In addition to the written report, data will be submitted in a spreadsheet compatible with Ecology's Sediment Management Unit format for entry into the SEDQUAL database. Reports will be submitted to the Ecology Sediment Management Unit.

8. HEALTH AND SAFETY PLAN

Sample collection activities follow the general requirements of the Parametrix Health and Safety Manual (Parametrix 2004). A copy of the manual, emergency phone numbers, and a map showing routes to hospitals, will be kept on the sampling vessel in a location known to all crew members. A mobile telephone will also be available on board the vessel. Level D personal protection equipment will be used by staff handling sediment samples and operating sampling equipment, and all personnel on the sampling vessel will be required to wear personal flotation devices.

9. SCHEDULE

A Draft Sediment Characterization Report conforming to the SAP will be prepared within 30 days of receipt of laboratory data. Following review by the Port of Vancouver, a Final Sediment Characterization Report will be submitted to the Port of Vancouver. It is anticipated that sampling will take place in October 2005.

10. PROJECT TEAM AND RESPONSIBILITIES

The sediment sampling field crew will consist of the Field Operations Coordinator and one field technician. Mr. David Gillingham, Field Operations Coordinator, is responsible for overseeing all aspects of the field sampling, ensuring adherence to the SAP, ensuring accurate station locations, making decisions on deviations from the SAP necessitated by field conditions, completing chain-of-custody forms, and keeping field logs and sample logs. The field technician is responsible for assisting with sample collection, handling, and transport. The field technician will also be designated as field safety officer.

In addition to the field crew, Ms, Anne Sylvester, the project manager, is responsible for the overall management of the investigation and will serve as a contact for involved federal and state agencies. Mr. Stuart Currie, the Project QA Manager, is responsible for interacting with the analytical laboratories and completing data quality assurance reviews.

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Washing State Department of Ecology. 1988. Screening Survey for Chemical Contaminants and Toxicity in Sediments at Five Lower Columbia River Ports, September 22-24, 1987. Publication Number 88-e15.

Wind Ward Environmental, March 2000. Alcoa Former Vancouver Works Sediment Investigation Data Report. Wind Ward Environmental LLC, 200 West Mercer Street, Suite 401, Seattle, Washington.

APPENDIX A

1988 Screening Survey Report

APPENDIX B

2001 VANALCO Aluminum (former ALCOA Aluminum Plant)

APPENDIX C

1997 Columbia River Channel Deepening Feasibility Study

APPENDIX D

SEDQUAL Data Tables

APPENDIX E

Flushing Channel Dredge Characterization

APPENDIX F

Berth 15 Terminal 4 Facility Dredge Characterization

DEPARTMENT OF THE ARMY
PORTLAND DISTRICT, CORPS OF ENGINEERS
P.O. BOX 2946
PORTLAND, OREGON 97208-2946

August 21, 2006

REPLY TO
ATTENTION OF:
Operations Division
Regulatory Branch
Corps No. 200500116

Ms. Patty Boyden
Port of Vancouver
P.O. Box 1180
3103 N.W. Lower River Road
Vancouver, Washington 98660-1027

Dear Ms. Boyden:

The U.S. Army Corps of Engineers (Corps) has received your permit application requesting Department of the Army authorization to do geotechnical borings and sediment sampling in and adjacent to the Columbia River as shown in the enclosed drawings (Enclosure 1). The project is located near Vancouver, Clark County, Washington.

The geotechnical boring will be conducted in upland, wetland, and aquatic locations. As many as 18 boreholes will be drilled in various locations as shown in Figure 1 of the enclosed drawings. The project also includes the collection of subsurface sediment samples within the bed of the Columbia River. Forty-nine samples will be collected from the locations shown in Figures 1-3A and 1-3B of the enclosed drawings. Sampling is being conducted as described in 1) the *Sediment Sampling and Analysis Plan, Port of Vancouver, Vessel Approach and Turning Basin Dredging Project*, dated October 2005, 2) *Supplemental Information for Port of Vancouver Sediment Sampling and Analysis Plan*, dated July 27, 2006, and 3) an email dated August 15, 2006, from April Zohn (Jones and Stokes) to Stephanie Sterling (Corps of Engineers, Seattle District). The Regional Management Team has reviewed the sampling protocols described in these documents and has given approvals for the sampling to proceed.

This letter verifies that your project is authorized under the terms and limitations of Nationwide Permit (NWP) No. 6 (Survey Activities). In order for this NWP to be valid, you must ensure the work is performed in accordance with the enclosed *Nationwide Permit [6], Terms and Conditions* (Enclosure 2) and the following special condition[s] that we have added to ensure this project will have no more than a minimal adverse impact on the aquatic environment:

a. The permittee shall comply with the Hydraulic Project Approval issued by the Washington Department of Fish and Wildlife on February 15, 2006 (Enclosure 3).

b. The Corps has made the determination that the proposed project may affect, but is not likely to adversely affect Chinook (*Oncorhynchus tshawytcha*) and Steelhead (*O. mykiss*), Sockeye (*O. nerka*), and Chum (*O. keta*). The Biological Opinion which the Corps used to evaluate your proposal for compliance with the ESA and the Magnuson-Stevens Act, is a programmatic procedure developed with National Marine Fisheries Service (NMFS) for specific activities requiring a Corps permit entitled *Standard Local Operating Procedures for Endangered Species (Slopes) for Certain Regulatory and Operations Activities Carried Out by the Department of the Army Permits in Oregon and the North Shore of the Columbia River*, dated November 30, 2004. The Corps recommends that you review the SLOPES opinion in its entirety, which you may obtain on-line at https://www.nwp.usace.army.mil/op/g/notices/Slopes.pdf. It is our understanding that NMFS has waived the in-water work window for the purpose of taking sediment samples (based on an email from Cathy Tortorici, NMFS, to April Zohn dated February 15, 2006).

1. The Permittee shall notify the Corps with the start of work date by submitting an email to CENWP.Notify@usace.army.mil or a letter to the address provided in Special Condition #6 below.

2. Project Access. The Permittee shall ensure that the landowner(s) provide reasonable access to the project area for monitoring the use and effectiveness of permit conditions. Reasonable access means, with prior notice to the Permittee, the Corps and National Marine Fisheries Service (NMFS) may, at reasonable times and in a safe manner, enter and inspect the permitted project to ensure compliance with the reasonable and prudent measures and terms and conditions of SLOPES III.

3. Salvage Notice. If a sick, injured or dead specimen of a threatened or endangered species is found, the finder must notify the Portland Office of NMFS Law Enforcement at 503-231-6240. The finder must take care in the handling of sick or injured specimens to ensure effective treatment, and in handling dead specimens to preserve biological material in the best possible condition for later analysis of cause of death. The finder also has the responsibility to carry out instructions provided by Law Enforcement to ensure that evidence intrinsic to the specimen is not disturbed unnecessarily.

4. Conditions. The Permittee shall fully implement all conditions, as applicable to the permitted activity, in Reasonable and Prudent Measure (RPM) #2. These RPMs are outlined in Enclosure 4. [Please note the general terms and conditions of these RPMs cover an array of diverse activities and not all requirements may apply to your particular project.]

5. Project Completion Report. The Permittee shall submit a project completion report to the Corps within 60 days of finishing work below ordinary high water. The report must contain the following information (as applicable) and be available for inspection on request by NMFS.

i. Applicant's name and permit number.
ii. Corps contact person.
iii. Project name.
iv. Type of activity.
v. Project site, including any compensatory mitigation site, by 5th field HUC
vi. Start and end dates for work completed.
vii. Photos of habitat conditions at the project site, including any compensator mitigation site, before, during, and after project completion.
viii. Projects with the following work elements must include these data:
(1) Work cessation – Dates work ceased due to high flows.
(2) Fish screen – Proof of compliance with NMFS fish screen criteria.
(3) Pollution control – A summary of pollution and erosion control inspections, including any erosion control failure, contaminant release, and correction effort.
(4) Drilling – Describe the drilling method and steps taken to isolate drilling operations, fluids, slurry and spoils from flowing water.
(5) Pilings – The number, type, and diameter of pilings removed, broken during removal, and installed; and any sound attenuation measures used.
(6) Site preparation – Riparian area cleared within 150 feet of ordinary high water; upland area cleared; new impervious area created.
(7) Streambank stabilization – Type and amount of materials used; project size (one bank or two, width and linear feet).
(8) Road construction, repairs and improvements – Rationale for any new permanent road crossing design.
(9) In-water and over-water structures – Area of new in-water or overwater structure.

6. The Permittee shall provide all documentation and reports, as required for submittal under Standard Local Operating Procedures for Endangered Species, to the following address:

U.S. Army Corps of Engineers
CENWP-OP-GC (Multnomah County/Corps No. 200500116)
P.O. Box 2946
Portland, Oregon 97208

In order for this NWP authorization to be valid, the Washington State Department of Ecology (Ecology) must have issued or waived Section 401 Water Quality Certification (WQC). Based on our review of the proposed work, the Corps has determined the proposed work will be in compliance with Ecology's WQC requirements for this NWP. Therefore, no further coordination with Ecology is required. We direct your attention to General Condition 14 that requires you to submit a signed certificate when the work is completed. A "Compliance Certification" is provided (Enclosure 5).

Please be aware that failure to comply with any of the listed conditions could result in the Corps initiating an enforcement action. This authorization does not obviate the need to obtain other permits where required.

This verification is valid until the NWP is modified, reissued, or revoked. All the existing NWPs are scheduled to be modified, reissued, or revoked prior to March 18, 2007. It is incumbent upon you to remain informed of changes to the NWPs. We will issue a public notice when the NWPs are reissued. Furthermore, if you commence or are under contract to commence this activity before the date that the relevant nationwide permit is modified or revoked, you will have twelve (12) months from the date of the modification or revocation of the NWP to complete the activity under the present terms and conditions of the current nationwide permit.

If you have any questions regarding this nationwide permit verification, please contact Ms. Judy Linton at the letterhead address or telephone (503) 808-4382.

Sincerely,

Lawrence C. Evans
Chief, Regulatory Branch

Enclosures

Copy Furnished:

Jones & Stokes (April Zohn)
Washington Department of Ecology

Andrew Somes - RE: Port of Vancouver Sampling PLan Approval

From: "April Zohn" <AZohn@jsanet.com>
To: "Stirling, Stephanie K NWS" <Stephanie.K.Stirling@nws02.usace.army.mil>, "Linton, Judy L NWP" <Judy.L.Linton@nwp01.usace.army.mil>
Date: 8/17/2006 4:14 PM
Subject: RE: Port of Vancouver Sampling PLan Approval
CC: "Stuart, Janice F NWP" <Janice.F.Stuart@nwp01.usace.army.mil>, "Andrew Somes" <asomes@parametrix.com>, "Brad Hermanson" <bhermanson@parametrix.com>, "Rick Oestman" <ROestman@jsanet.com>, "Emily Roth" <eroth@jsanet.com>, "Patty Boyden" <PBoyden@Portvanusa.com>, "April Zohn" <AZohn@jsanet.com>

Thanks for your help, Stephanie. I'm glad were able to address all of the RMT's comments with the supplemental materials.

Judy, please let me know if you need any additional assistance in finalizing the NWP verification letter. I am available today and tomorrow if you need me.

April Zohn
Jones & Stokes
Regulatory Compliance Specialist
317 SW Alder Street, Suite 800 • Portland OR 97206
W: 503.248.9507, extension 227 • Fx: 503.228.3820 •
M: 503.381.6159
azohn@jsanet.com www.jonesandstokes.com

Your Project Means the World to Us

-----Original Message-----
From: Stirling, Stephanie K NWS [mailto:Stephanie.K.Stirling@nws02.usace.army.mil]
Sent: Thursday, August 17, 2006 4:08 PM
To: April Zohn; Linton, Judy L NWP
Cc: Stuart, Janice F NWP
Subject: RE: Port of Vancouver Sampling PLan Approval

Hi Judy and April -

I wanted to let you know that the Port of Vancouver has responded to the RMT comments and concerns regarding sampling locations and sampling intensity for this project and have answered the questions we raised. In addition, the Port has provided us with the estimated volume for each of the DMMU.

The SAP is approved. For this project, National Marine Fisheries Service has provided separate comments to the applicant.

Stephanie Stirling

Andrew Somes - Port of Vancouver - Supplemental SAP Materials (August 2006)

From: "April Zohn" <AZohn@jsanet.com>
To: "Stephanie Stirling" <Stephanie.K.Stirling@nws02.usace.army.mil>
Date: 8/15/2006 5:47 PM
Subject: Port of Vancouver - Supplemental SAP Materials (August 2006)
CC: "Stuart, Janice F NWP" <Janice.F.Stuart@nwp01.usace.army.mil>, "Linton, Judy L NWP" <Judy.L.Linton@nwp01.usace.army.mil>, "Emily Roth" <eroth@jsanet.com>, <pboyden@portvanusa.com>, "Rick Oestman" <ROestman@jsanet.com>, "Andrew Somes" <asomes@parametrix.com>, "April Zohn" <AZohn@jsanet.com>, "Stacy McDowell" <smcdowell@jsanet.com>, "Edberg, Monty" <Monty.Edberg@abam.com>, "DelRosario, Cesar" <Cesar.DelRosario@abam.com>

Stephanie,

Thanks for the phone call this morning regarding the RMT's comments on the Port of Vancouver's SAP. Based on our conversation, as well as several emails we exchanged on August 10, 2006, we understand that the RMT has requested the SAP be modified to reflect identification of **49 distinct core sample locations which will be composited into 25 samples for analysis**. To that end, Figure 1-3 has been revised to reflect 49 core sample locations based on 49 DMMUs (see attached figure). Each of the 49 DMMUs represents a dredge volume of approximately 32,000 cy (+ / - 25%). Following sample collection, two adjacent core sample locations will be composited to represent a "composite DMMU" with an approximate volume of 64,000 cubic yards. This will result in the collection and analysis of 24 composite DMMU samples and one individual DMMU sample (due to odd number of samples collected).

Sample composite material will be collected from the full length of each of the core samples to be composited, excluding the section representing material below that to be dredged. Material from the near surface material (NSM) will be archived, and will be analyzed separately only if material from the core section above has chemical concentrations exceeding applicable criteria. The NSM from the cores that comprised the composite sample that exceeded applicable criteria would only be analyzed for the chemical(s) that exceeded the criteria.

<u>Other points of clarification from this mornings conversation:</u>

- We had discussed preparing a table that illustrates the volume of each DMMU. Given that they are all of approximately equal volume, is this still necessary? It turns out that it will take several days to generate a table indicating the volumes of material in each DMMU, because of the way the boudaries were calculated. Given our tight time line, I am hoping that the fact that we have generated the boundaries based on an approximate volume of 32,000 cy will be adequate to meet the RMT's concerns. If this is an issue, please call me as soon as possible so that I can have our staff begin generating the necessary table.

- The attached figure should be printed in 11 x 17 for review. I have asked that Berger/Abam reformat the figure so that it is on two, 8.5 x 11 sheets to meet your permitting requirements. The re-formatted graphic will be forwarded to you tomorrow.

It is our understanding that these materials will be distributed to the RMT for review and approval. Given other scheduling considerations at the Portland regulatory district, we are hoping to receive comments and approval from the RMT by this Thursday, August 17. Those comments and approval would be forward to Judy Linton, allowing her to complete the NWP verification process for this sampling project.

We understand everyone's budy schedules and appreciate feedback on these materials as soon as possible. Don't hesitate to give me a call if you need additional information or clarification on what we have sent over. I am available on my cell phone all day tomorrow - 503/381-6159.

Thanks in advance for your consideration, April

April Zohn
Jones & Stokes
Regulatory Compliance Specialist
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